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(54) **SYSTEMS AND METHODS FOR SHOPPING DETOUR DURING TRAFFIC CONGESTION**

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(56) **References Cited**

U.S. PATENT DOCUMENTS

7,792,703	B1 *	9/2010	Amidon	....	G06F 17/3087
					705/26.1
8,612,312	B1 *	12/2013	Edwards	....	G06Q 30/0633
					705/26.8
8,793,066	B2 *	7/2014	Panabaker	....	G01C 21/34
					701/410
2003/0093217	A1 *	5/2003	Petzold	....	G01C 21/3484
					701/411
2003/0195694	A1 *	10/2003	Kozak	....	G01C 21/3484
					701/424
2007/0150369	A1 *	6/2007	Zivin	....	G06Q 30/02
					705/26.64
2008/0091341	A1 *	4/2008	Panabaker	....	G01C 21/34
					701/533
2010/0114734	A1 *	5/2010	Giuli	....	G06Q 20/12
					705/26.1
2010/0153008	A1 *	6/2010	Schwartz	....	G01C 21/20
					701/408
2013/0226731	A1 *	8/2013	MacNeille	....	G06Q 10/00
					705/26.8

* cited by examiner

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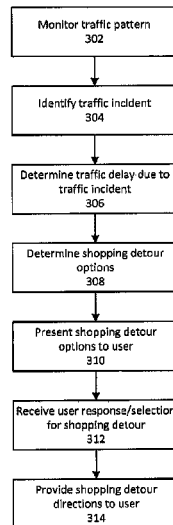*Assistant Examiner* — Majdi Alsomiri
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(57) **ABSTRACT**

A system or a method is provided to provide shopping detours to users during traffic congestions. In particular, the system may detect that a user is experiencing or is about to experience a traffic congestion. The system may then estimate the additional travel time needed to go through the traffic congestion. The system may also find shopping detours which allow the user to take the shopping detours to make purchases and still arrive at the final destination at about the same time as if the user stays in the original route with the traffic congestion.
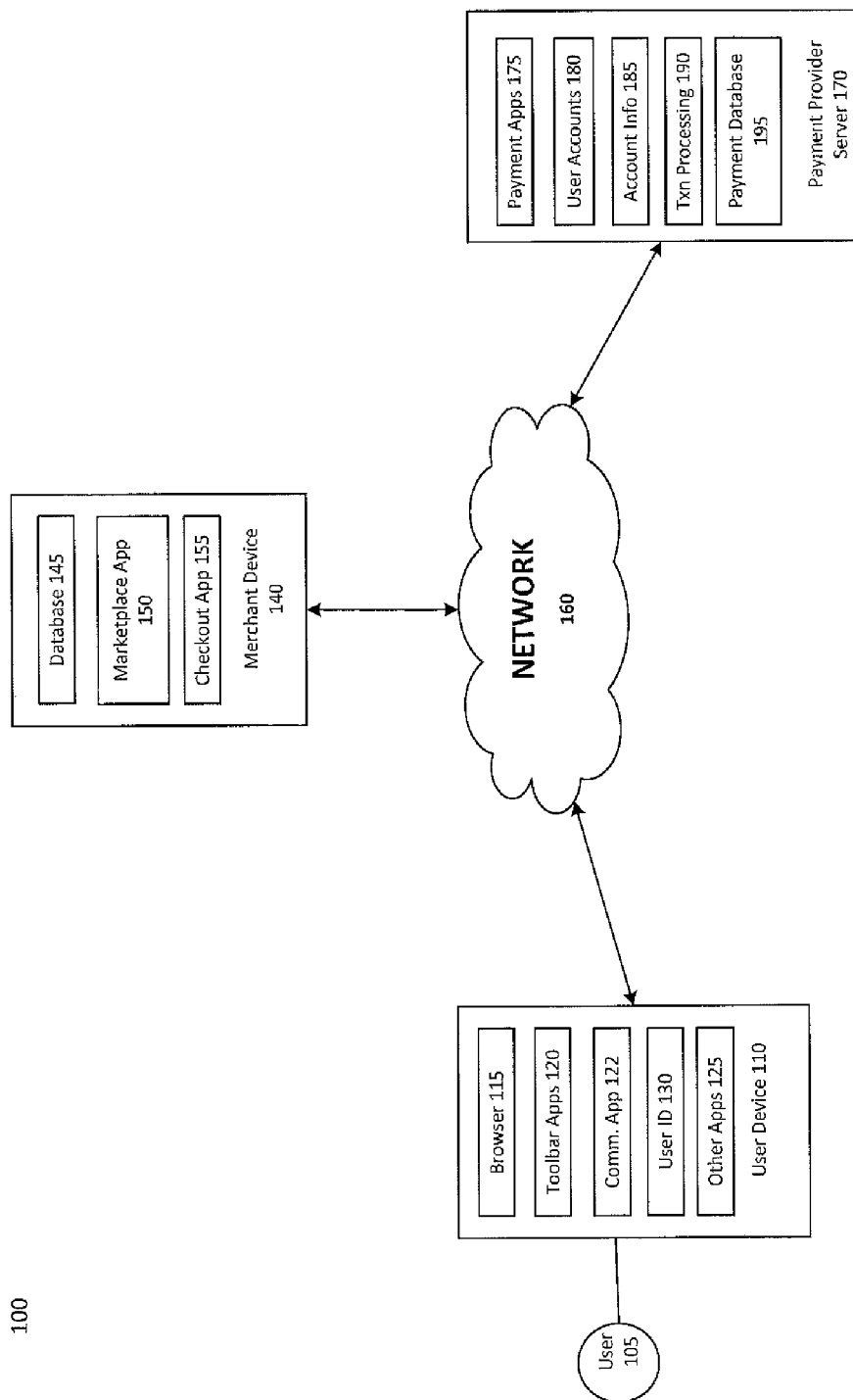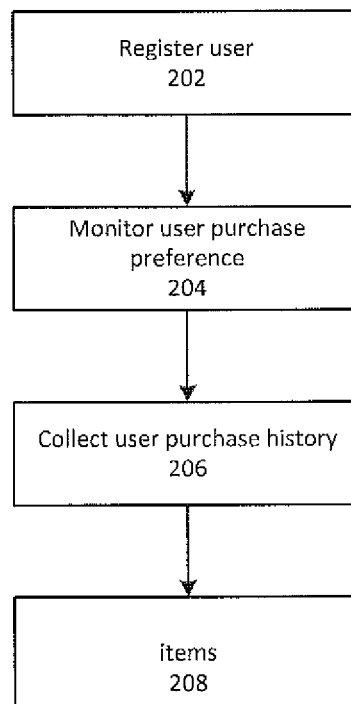
20 Claims, 4 Drawing Sheets

300

100

User
105

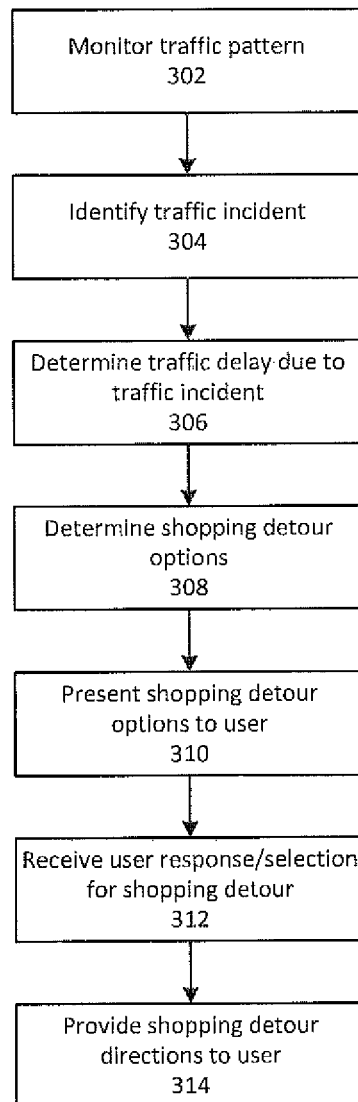**User Device 110**

Browser 115

Toolbar Apps 120

Comm. App 122

User ID 130

Other Apps 125

NETWORK 160

Merchant Device 140

Database 145

Marketplace App 150

Checkout App 155

Payment Provider Server 170

Payment Apps 175

User Accounts 180

Account Info 185

Txn Processing 190

Payment Database 195

FIG. 1

200

```
┌─────────────────────┐
│    Register user     │
│         202          │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│ Monitor user purchase│
│     preference       │
│         204          │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│Collect user purchase history│
│         206          │
└─────────────────────┘
           │
           ▼
┌─────────────────────┐
│        items         │
│         208          │
└─────────────────────┘
```

FIG. 2

300


```
┌─────────────────────────┐
│   Monitor traffic pattern│
│           302           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│   Identify traffic incident│
│           304           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Determine traffic delay due to│
│      traffic incident   │
│           306           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│  Determine shopping detour│
│         options         │
│           308           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│   Present shopping detour│
│      options to user    │
│           310           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Receive user response/selection│
│    for shopping detour  │
│           312           │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│   Provide shopping detour│
│    directions to user   │
│           314           │
└─────────────────────────┘
```

FIG. 3

Disk Drive 417

Storage 416

Memory 414

Bus 402

Network Interface 406

Processor 412

Communications Link
418

Display 411

Input/Output 404

Audio I/O 405

Cursor Control 413

400

FIG. 4

SYSTEMS AND METHODS FOR SHOPPING DETOUR DURING TRAFFIC CONGESTION

BACKGROUND

1. Field of the Invention

The present invention generally relates to systems and methods for shopping detours during traffic congestion.

2. Related Art

Consumers increasingly use electronic navigation devices to provide travel guidance and navigation. Although the electronic navigation devices may provide directions to various destinations, consumers often still experience traffic congestion that cause travel delays. For example, when a consumer is traveling home from work, the consumer may experience rush hour traffic that causes delay. Although there may be alternative routes for the consumer to take, these alternative routes may have the similar traffic delays due to the overall traffic congestion in the area. Therefore, there is a need for a system or method that provides meaningful detours for the consumer during traffic congestion.

BRIEF DESCRIPTION OF THE FIGURES

FIG. 1 is a block diagram of a networked system suitable for implementing shopping detours during traffic congestion.

FIG. 2 is a flowchart showing a process of setting up a user account for shopping detours according to an embodiment.

FIG. 3 is a flowchart showing a process for implementing shopping detours during traffic congestion according to one embodiment.

FIG. 4 is a block diagram of a computer system suitable for implementing one or more components in FIG. 1 according to one embodiment.

Embodiments of the present disclosure and their advantages are best understood by referring to the detailed description that follows. It should be appreciated that like reference numerals are used to identify like elements illustrated in one or more of the figures, wherein showings therein are for purposes of illustrating embodiments of the present disclosure and not for purposes of limiting the same.

DETAILED DESCRIPTION

According to an embodiment, a system or a method is provided to provide shopping detours to users during traffic congestion. In particular, the system may detect that a user is experiencing or is about to experience a traffic congestion or delay. The system may then estimate the additional travel time needed to get through the traffic congestion and arrive at the desired destination. The system may also find shopping detours which allow the user to take the shopping detours to make purchases and still arrive at the final destination at about the same time as if the user had stayed on the original route with the traffic congestion or which allow the user to take a shopping detour and spend less total time shopping and driving than if the user stayed on the original route and did the shopping on a separate trip.

In an embodiment, the system may analyze the user's purchase history, to-do-list, search history, watch list, wish list, calendar, or the like to determine items or services the user may desire to purchase. The system may find merchants that offer the desired items or services that are located near the traffic congestion or in-route to the final destination. The system may estimate the time required to take an alternate route to make purchases, including detour travel time, traffic conditions along the detour route, check-out line at the mer-

chant, availability of items or services at the merchant, expected time to finish shopping and get back on a route to a desired destination, estimated traffic conditions along a route to the desired destination and drive time after the user has finished shopping, and the like. The system may compare the additional time caused by the traffic congestion with the time for taking the shopping detours and may present a list of possible shopping detours to the user. The possible shopping detours may allow the user to take one or more of the shopping detours and still save on total time, such as arriving at the final destination at about the same time as if the user had stayed on the original route or arriving after an estimated time with traffic, but spending less time driving to the destination with traffic and then later doing the shopping. The user may select and accept a shopping detour and the system may provide recommended directions to the user to take for the one or more shopping destinations. For example, even though a route to a desired shopping destination may be shorter if the user stayed on the current route, a longer route may be recommended to save time, such as by exiting the current route and proceeding along a longer, but faster route.

The system may also access the user's calendar to determine when the user may need to be at a certain location or destination. Based on that, the system may recommend staying on the current route with congestion, even though taking a shopping detour may save overall time, because the user would not be able to make it to the calendar appointment by taking the shopping detour.

Thus, a user may save time by taking a detour to make one or more purchases to allow traffic congestion or delays to reduce, even though the user may not need to make the purchase at that time.

In an embodiment, the system may provide incentives, such as coupons or discounts, along with shopping detour suggestions. These may allow merchants to advertise to consumers during traffic congestion. In an embodiment, the system may allow the user to browse and order the item or service while in route to the merchant. As such, the user may pick up the purchased item at the merchant quickly. In an embodiment, the system may estimate and compare not only the travel time, but also the travel cost, e.g., gasoline or electricity cost, of the shopping detour with those of the original route with traffic congestion. Thus, the user may compare the travel time along with other travel cost to decide whether to take a shopping detour and/or which shopping detour to take.

FIG. 1 is a block diagram of a networked system 100 suitable for implementing shopping detours during traffic congestions according to an embodiment. Networked system 100 may comprise or implement a plurality of servers and/or software components that operate to perform various payment transactions or processes. Exemplary servers may include, for example, stand-alone and enterprise-class servers operating a server OS such as a MICROSOFT® OS, a UNIX® OS, a LINUX® OS, or other suitable server-based OS. It can be appreciated that the servers illustrated in FIG. 1 may be deployed in other ways and that the operations performed and/or the services provided by such servers may be combined or separated for a given implementation and may be performed by a greater number or fewer number of servers. One or more servers may be operated and/or maintained by the same or different entities.

System 100 may include a user device 110, a merchant server 140, and a payment provider server 170 in communication over a network 160. Payment provider server 170 may be maintained by a payment service provider, such as PayPal, Inc. of San Jose, Calif. A user 105, such as a sender or consumer, utilizes user device 110 to perform a transaction

using payment provider server **170**. User **105** may utilize user device **110** to initiate a payment transaction, receive a transaction approval request, or reply to the request. Note that transaction, as used herein, refers to any suitable action performed using the user device, including payments, transfer of information, display of information, etc. For example, user **105** may utilize user device **110** to initiate a deposit into a savings account. Although only one merchant server is shown, a plurality of merchant servers may be utilized if the user is purchasing products or services from multiple merchants.

User device **110**, merchant server **140**, and payment provider server **170** may each include one or more processors, memories, and other appropriate components for executing instructions such as program code and/or data stored on one or more computer readable mediums to implement the various applications, data, and steps described herein. For example, such instructions may be stored in one or more computer readable media such as memories or data storage devices internal and/or external to various components of system **100**, and/or accessible over network **160**. Network **160** may be implemented as a single network or a combination of multiple networks. For example, in various embodiments, network **160** may include the Internet or one or more intranets, landline networks, wireless networks, and/or other appropriate types of networks.

User device **110** may be implemented using any appropriate hardware and software configured for wired and/or wireless communication over network **160**. For example, in one embodiment, user device **110** may be implemented as a personal computer (PC), a smart phone, personal digital assistant (PDA), laptop computer, automobile console, and/or other types of computing devices capable of transmitting and/or receiving data, such as an iPad™ from Apple™.

User device **110** may include one or more browser applications **115** which may be used, for example, to provide a convenient interface to permit user **105** to browse information available over network **160**. For example, in one embodiment, browser application **115** may be implemented as a web browser configured to view information available over the Internet, such as a user account for setting up a shopping list and/or merchant sites for viewing and purchasing products and services. User device **110** may also include one or more toolbar applications **120** which may be used, for example, to provide client-side processing for performing desired tasks in response to operations selected by user **105**. In one embodiment, toolbar application **120** may display a user interface in connection with browser application **115**.

User device **110** may further include other applications **125** as may be desired in particular embodiments to provide desired features to user device **110**. For example, other applications **125** may include security applications for implementing client-side security features, programmatic client applications for interfacing with appropriate application programming interfaces (APIs) over network **160**, or other types of applications. User device **110** also may include a positioning device, such as a Global Positioning System (GPS), a gyroscope, or other devices configured to detect a position and movement of the user device **110**.

Applications **125** may also include email, texting, voice and IM applications that allow user **105** to send and receive emails, calls, and texts through network **160**, as well as applications that enable the user to communicate, transfer information, make payments, and otherwise utilize a smart wallet through the payment provider as discussed above. User device **110** includes one or more user identifiers **130** which may be implemented, for example, as operating system reg-

istry entries, cookies associated with browser application **115**, identifiers associated with hardware of user device **110**, or other appropriate identifiers, such as used for payment/user/device authentication. In one embodiment, user identifier **130** may be used by a payment service provider to associate user **105** with a particular account maintained by the payment provider. A communications application **122**, with associated interfaces, enables user device **110** to communicate within system **100**.

Merchant server **140** may be maintained, for example, by a merchant or seller offering various products and/or services. The merchant may have a physical point-of-sale (POS) store front. The merchant may be a participating merchant who has a merchant account with the payment service provider. Merchant server **140** may be used for POS or online purchases and transactions. Generally, merchant server **140** may be maintained by anyone or any entity that receives money, which includes charities as well as banks and retailers. For example, a payment may be a donation to charity or a deposit to a saving account. Merchant server **140** may include a database **145** identifying available products (including digital goods) and/or services (e.g., collectively referred to as items) which may be made available for viewing and purchase by user **105**. Accordingly, merchant server **140** also may include a marketplace application **150** which may be configured to serve information over network **160** to browser **115** of user device **110**. In one embodiment, user **105** may interact with marketplace application **150** through browser applications over network **160** in order to view various products, food items, or services identified in database **145**.

Merchant server **140** also may include a checkout application **155** which may be configured to facilitate the purchase by user **105** of goods or services online or at a physical POS or store front. Checkout application **155** may be configured to accept payment information from or on behalf of user **105** through payment service provider server **170** over network **160**. For example, checkout application **155** may receive and process a payment confirmation from payment service provider server **170**, as well as transmit transaction information to the payment provider and receive information from the payment provider (e.g., a transaction ID). Checkout application **155** may be configured to receive payment via a plurality of payment methods including cash, credit cards, debit cards, checks, money orders, or the like.

Payment provider server **170** may be maintained, for example, by an online payment service provider which may provide payment between user **105** and the operator of merchant server **140**. In this regard, payment provider server **170** includes one or more payment applications **175** which may be configured to interact with user device **110** and/or merchant server **140** over network **160** to facilitate the purchase of goods or services, communicate/display information, and send payments by user **105** of user device **110**.

Payment provider server **170** also maintains a plurality of user accounts **180**, each of which may include account information **185** associated with consumers, merchants, and funding sources, such as banks or credit card companies. For example, account information **185** may include private financial information of users of devices such as account numbers, passwords, device identifiers, user names, phone numbers, credit card information, bank information, or other financial information which may be used to facilitate online transactions by user **105**. Advantageously, payment application **175** may be configured to interact with merchant server **140** on behalf of user **105** during a transaction with checkout application **155** to track and manage purchases made by users and which and when funding sources are used.

In some embodiments, payment provider server **170** may store purchase history of various items purchased by user **105**. Payment provider server **170** may analyze purchase history to determine user **105**'s purchase preferences, merchant preferences, and/or potential purchase targets. Payment provider server **170** also may have access to user **105**'s calendar, schedule, to-do list, emails, social network accounts, and the like. Payment provider server **170** may analyze these accounts to infer purchase preferences or purchase targets. In an embodiment, payment provider sever **170** may store travel history of the user **105** including routes taken by the user **105** or places or merchants visited by the user **105**. The travel history may be used to infer user **105**'s travel preferences.

A transaction processing application **190**, which may be part of payment application **175** or separate, may be configured to receive information from user device **110** and/or merchant server **140** for processing and storage in a payment database **195**. Transaction processing application **190** may include one or more applications to process information from user **105** for processing an order and payment using various selected funding instruments, including for initial purchase and payment after purchase as described herein. As such, transaction processing application **190** may store details of an order from individual users, including funding source used, credit options available, etc. Payment application **175** may be further configured to determine the existence of and to manage accounts for user **105**, as well as create new accounts if necessary.

FIG. 2 is a flowchart showing a process **200** for setting up a user account for shopping detours according to an embodiment. At step **202**, a user may register at payment provider server **170**. For example, a user may set up a payment account at payment provider server **170** using user device **140**. The payment account may be used for making payments for purchases made by the user. The payment account may include user information, such as user identification, password, user preferences, funding accounts, and the like.

At step **204**, payment provider server **170** may monitor user purchase preferences. For example, when user **105** uses user device **140** to search or browse various products or services, payment provider server **170** may determine a potential purchase target based on user **105**'s browsing or search history. For example, user **105** may have been searching or browsing various types of laptops using user device **140**, the browsing and searching history related to the various types of laptops may be sent to payment provider server **170**.

In one embodiment, user **105** may give permission to payment provider server **170** to access the browsing or search history at user device **140**. Payment provider server **170** may analyze the browsing history and search history and determine that user **105** is looking to purchase a laptop. In particular, payment provider server **170** may determine the type of laptop user **105** is looking for. Thus, the type of the laptop may be designated as a purchase target. User **105**'s purchase history also may be used to determine the user's purchase preference. For example, the type of products or services that had been purchased by user **105**, the merchants from which user **105** had made purchases, or the time and location where user **105** made purchases may be monitored and stored as a user purchase preference. In another example, payment provider server **170** may determine routine purchases, such as groceries, daily necessities, or the like, that are purchased by the user **105** routinely. Payment provider server **170** may determine the purchase routine frequency and may determine the user **105** likely is ready to make the routine purchase again soon. For example, the payment provider server **170** may determine that the user **105** typically purchases milk once a week on

Friday. The payment provider server **170** may then infer that the user **105** may wish to purchase milk this Friday.

In an embodiment, user **105** may give permission to payment provider server **170** to access user **105**'s calendar, to-do list, schedule, wish list, social network accounts, contact lists, travel history, and the like. The payment provider server **170** may analyze this information and may determine purchase preference and/or purchase targets from this information. For example, based on the user **105**'s to-do list and social network, the payment provider server **170** may determine that a friend's birthday is coming up and the user **105** may wish to purchase a birthday gift for the friend. In another example, payment provider server **170** may analyze the user **105**'s travel history and may determine routine travel routes, such as commuting from home to work, taken by the user **105**. Payment provider server **170** may identify merchants along user **105**'s routine travel routes and possible shopping detours or destinations.

At step **216**, payment provider server **170** may collect user purchase history. For example, when user **105** uses user device **140** or an account with the payment provider to make a purchase, payment provider server **170** may collect information related to the purchase, including the identity and type of items purchased, price of the item purchased, location and time of purchase, merchant from whom the purchase was made, or other information related to the purchase. In an embodiment, payment provider server **170** may have access to user **105**'s account at various merchants and may determine user **105**'s purchase and/or browsing history at the merchants based on the user **105**'s account at these merchants. Payment provider server **170** also may access the user **105**'s electronic wallet and electronic coupons. For example, the user **105** may save or designate certain electronic coupons to be used later. Payment provider server **170** may determine purchase preference or purchase targets based on these saved electronic coupons.

At step **218**, payment provider server **170** may infer the user **105**'s purchase targets or desired purchase items based on various information collected, as noted above. The purchase target may be inferred from routine purchases or from routine merchants whom the user **105** frequently visits. For example, the payment provider server **170** may determine that the user **105** typically visits an auto-mechanic shop to receive oil change service on the user **105**'s car once every three months. The payment provider server **170** may determine that an oil change service is a purchase target when the time for an oil change in the three month cycle is coming up soon.

The purchase target may be inferred from the user **105**'s wish list, to-do list, calendar, and/or social network. For example, the user **105** may have a task of purchasing a birthday card for the user's friend on the user **105**'s to-do list and the user **105**'s social network account indicates that the friend's birthday is coming up soon. The payment provider server **170** may determine that a birthday card or gift is a purchase target. In an embodiment, the purchase target may be inferred from environmental conditions detected by the user device **110**. For example, the user device **110** may detect the time of the day, the season of the year, the weather condition and/or forecast, or the like. These environmental conditions may be used to infer a purchase target. If it's during meal time, purchase targets related to food products or services may be inferred. If the weather is too hot or too cold, services or products associated with outdoor activities may be avoided. If a car console detects that the user **105**'s car needs gas or certain maintenance, the purchase targets may include gas station or auto mechanics. Even if the car does not need

gas right away, but may need gas the next day, a gas station may be a suggested purchase target if it enables traffic congestion to reduce during the time it takes the user to detour to a gas station, get gas, and get back on a route. If the car console or the user device **110** detects that the user **105** is falling asleep or has low energy, for example, by monitoring the user **105**'s heart beat or tracking the user **105**'s eye movement, purchase targets, such as coffee shops, rest areas, or rest stops, may be inferred.

In an embodiment, the payment service provider **170** may calculate a probability score for each target purchase item. The probability score may represent a likelihood that the user **105** intends to or desires to purchase the item. The probability score may be determined based on whether the item is a routine purchase. For example, if the item is consistently purchased many times as a regular routine, the probability score is higher. The probability score also may be determined based on the number sources the item is inferred from. For example, if the target purchase item is inferred from multiple sources, such as from the user **105**'s social network, the user's calendar, and the user's to-do list, the target purchase item may have a higher probability score.

The probability score also may be determined based on the type of sources the item is inferred from. For example, a target purchase item inferred from the user **105**'s to-do list may have a higher probability score than another target purchase item inferred from the user **105**'s watch list, because the user **105**'s to-do list indicates that the user **105** has decided to make the purchase while the user **105**'s watch list merely indicates that the user is interested in an item. The probability score may be used to determine whether the user **105** is about to or is intending to purchase an item. For example, when the probability score of an item is above a predetermined threshold, the item may be designated as a purchase target which the user **105** is intending to or desires to purchase. The predetermined threshold may be adjusted to increase or decrease the number of designated purchase targets.

By using the above process **200**, various information may be collected to infer purchase targets that the user **105** may wish to purchase. In particular, information, such as purchase history, browsing history, to-do list, wish list, customer accounts, calendar, social network accounts, and the like, may be used to infer purchase targets that the user **105** may wish to purchase.

FIG. 3 is a flowchart showing a process **300** for implementing shopping detours during traffic congestion according to one embodiment. At step **302**, user device **110** may monitor traffic patterns. In particular, user device **110** may include a Global Positioning System (GPS) device configured to detect the position and movement of user device **110**. In particular, the user **105** may use the user device **110** to navigate or route the user **105** to a destination. The user device **110** may receive information regarding the traffic patterns near the user **105** and/or along the route to the destination. In an embodiment, user device **110** may send the location and route information to the payment provider server **170** and the payment provider server **170** may monitor the traffic patterns near user device **110** and/or along the route to the user **105**'s selected destination. Traffic information may be obtained from a third party that provides general traffic information to consumers or via crowd sourcing by receiving movement and/or location data from other users.

At step **304**, the system may identify traffic incidents near the user **105** or along the user **105**'s route to the final destination. The traffic incidents may be general congestion due to overcrowding. The traffic incidents may be a car accident or road construction that causes traffic congestion. Information about the traffic incidents may be received from a third party service that provides traffic information to consumers. Information about traffic incidents also may be received from other users via crowd sourcing. In an embodiment, traffic incidents may be identified based on traffic history. For example, routine traffic congestion during certain rush hours may be identified at certain locations based on the traffic history. Information about the traffic incident may include type of incident, effect of the incident, such as traffic lane reduction, distance range of the traffic incident, stretch of traffic delay, speed of traffic through the incident, and other information about the traffic incident. In some embodiments, multiple traffic incidents near the user **105** or along the user **105**'s route may be identified.

At step **306**, the system may determine traffic delay for the user **105** due to the traffic incident. In particular, the system may estimate the additional travel time that will be caused by the traffic incident. The traffic delay may be determined based on how far the user **105** currently is from the traffic congestion, the distance stretch of the traffic congestion, the speed of traffic in the traffic congestion, the speed of the traffic flow before and after the traffic congestion, speed limit, and the like. The traffic delay also may be determined based on how long the traffic congestion will last. For example, based on traffic history, time intervals of routine traffic congestion may be used to determine how long a typical traffic congestion will last. This information may be used to determine whether the traffic congestion will still be there when the user **105** reaches the location of the traffic congestion. In some embodiments, multiple traffic incidents may be identified and the traffic delays resulted from multiple traffic incidents may be estimated and aggregated.

At step **308**, the system may determine shopping detour options in view of the identified traffic congestion. The system may determine the user **105**'s potential purchase targets as noted in step **208**. For example, purchase targets may be inferred from information such as user's purchase history, browsing history, search history, to-do list, wish list, watch list; calendar, contact list, social network, and the like. The system then may select potential purchase targets that are most likely to be purchased and/or desired by the user **105** based on the probability scores of the items, as noted in step **208**. The system may also determine whether the user **105** has coupons or discounts that are associated with these potential targets. The system then may determine whether there are merchants near the user **105**, near or along the travel route, or along an alternative travel route to the user's desired final destination who offer the purchase targets for sale. The purchase targets may be products, services, or any items that may be purchased by the user.

After the merchants who offer the purchase targets for sale are identified, the system may determine the detour routes to the respective merchants. The detour routes may provide directions from the user **105**'s current location to the respective merchants, avoiding the traffic congestions, and then to the original final destination. In some embodiments, a detour route may include detours to multiple merchants. The system may estimate the time required to take the shopping detour. The time required for taking the shopping detour may include travel time to one or more merchants, shopping time at the merchant, and travel time from one or more merchants back to the original destination. To estimate travel time to the merchant, the system may consider traffic conditions near the merchant or along the route to the merchant, speed of traffic flow, number of traffic lights, traffic conditions along the route from the merchant back to the original destination, and

the like. This traffic information may be obtained from a third party provider of traffic information or from other users by crowd sourcing.

To estimate shopping time at the merchant, the system may consider whether the store is crowded, condition of the check-out lines at the merchant, availability of the item desired by the user, wait time at the merchant (for service merchant), availability of parking spaces at the merchant, type of service desired, estimated service time, and the like. This information at the merchant's store may be provided by the merchant, a third party, or from other users by crowd sourcing. In some embodiments, shopping time at the merchant may be estimated based on the user **105**'s previous visits to the merchant. For example, if the user **105** has visited the merchant before, the system may estimate the user **105**'s shopping at the merchant based on an average shopping time of the previous visits to the merchant.

In another embodiment, the system may estimate the service time at the merchant based on the user **105**'s previous service time at the merchant. For example, based on previous visits to the same auto mechanic, the system may determine that a typical visit to the same auto mechanic is about 45 minutes for an oil change. The system may allow the merchants, such as service merchants, to post or input estimated service time for various types or services. In an embodiment, the system may receive business condition history from various merchants and may estimate a wait time or service time for respective merchants based on their business condition history. For example, the business condition history of a merchant may include routine patterns of business condition indicating how crowded the merchant store is during different times of the day, different days of the week, different months or seasons of the year. As such, the business condition history may be used to estimate how crowded the merchant store will be when the user visits the store.

The system may estimate the time for taking the shopping detours to respective merchants based on the respective detour travel time and shopping time. In some embodiments, the time for taking a shopping detour to multiple merchants also may be estimated. Based on the estimated additional travel time that would be caused by the traffic congestion, the system may identify various options for shopping detours. For example, if the traffic congestion is estimated to cause 45 minutes of additional travel time, the system may identify shopping detours that will take about 40 to 50 minutes, such that the user may take one of these shopping detours and still arrive at the destination at about the same time as if the user had stayed in the original route with the traffic congestion. In some embodiments, the system may determine the estimated arrival time to the final destination for both the original route and the detours. Thus, the user may compare these estimated arrival times for taking the original route and for taking different shopping detours.

In an embodiment, the system may select or suggest shopping detour routes that allow the user to visit and shop at one or more merchants and still arrive at the final destination at about the same time as if the user had stayed on the original route. In another embodiment, the system may select or suggest shopping detour routes that allow the user to visit and shop at one or more merchants and arrive at the final destination faster than if the user had stayed on the original route. For example, the system may check the user **105**'s calendar or schedule and may determine that the user **105** has an appointment at the final destination at a certain time. As such, it is important that the user **105** arrives at the final destination before the certain time. Thus, the system may select or suggest shopping detour routes that allow the user to arrive at the final destination with spare time to attend the appointment. In still another embodiment, the system may select or suggest shopping detour routes that allow the user to save on the total travel time. For example, the total time for taking the shopping detour routes may be less than the total time of staying on the original route and taking a separate trip to one or more merchants. Based on the user **105**'s preference, the system may suggest shopping detours accordingly.

In an embodiment, the system may estimate and compare the travel cost for staying in the original route with the traffic congestion and the travel cost for taking a shopping detour. In particular, the system may estimate the travel cost for staying in the original route with the traffic congestion. For example, the travel cost for staying in the traffic congestion may include gas expense, wear on the car, and the like. Depending on the type of vehicle, miles per gallon (MPG) of the vehicle, the driving style of the user, the delay time of the traffic congestion, the speed of the traffic flow through the traffic congestion, and the like, the additional gas used due to the traffic congestion may be estimated. Similarly, the travel cost for taking the shopping detour may be estimated based on the distance of detour, the speed of traffic flow for the detour route, the type of vehicle, MPG of the vehicle, driving style of the user, parking cost, and the like. The travel cost for staying in the original route with traffic congestion and the travel cost for taking a shopping detour may be estimated for the user **105**'s comparison. Thus, the user **105** may make decision on whether to take the shopping detour based on the travel cost comparison.

The traveling cost may be estimated for each shopping detour option. Thus, the user may compare the travel cost between different shopping detour options. In an embodiment, the system also may estimate the travel time and travel cost for taking a non-shopping detour, in which a detour is taken to avoid the traffic congestion without visiting any merchants. Thus, the user may compare the travel time and cost for taking a non-shopping detour with those of the original route and the different shopping detours.

At step **310**, the system may present options for shopping detours to the user. In particular, information regarding the options for shopping detours may be displayed to the user **105** at user device **110**. The options for shopping detours may be displayed as a list of detours to various merchants. The information may include the name of the merchant, type of service or product offered at the merchant, the purchase target inferred, the price of the purchase target, wait time at the merchant, travel time for the detour to the merchant, travel cost for the detour, and the like. The estimated time for the shopping detour may be listed next to the estimated time delay due to the traffic congestion, such that the user may compare and decide whether to take the shopping detour. In an embodiment, the estimated travel cost for the shopping detour may be listed next to the estimated travel cost for staying in the original route with the traffic congestion.

In an embodiment, the list of options for shopping detours may be displayed to the user **105** in an order of inferred desirability of the purchase target. As noted above, a probability score may be calculated for each purchase target indicating how likely the purchase target is desired by the user **104** or how likely the user **105** intends to purchase the purchase target. The options for shopping detours may be displayed based on the probability score of the purchase target. In another embodiment, the list of options for shopping detours may be displayed based on how much the time for the shopping detour matches the delay time of the traffic congestion. For example, if the estimated traffic delay time is 30 minutes, the system may find shopping detours that take

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about the same amount of time of 30 minutes. The options of shopping detours that matches closely to 30 minutes may be displayed first on the list. In an embodiment, the list of option for shopping detours may be listed based on the travel costs for the different shopping detours. In still another embodiment, the user may be allowed to choose how the list of options for shopping detours is displayed. In an embodiment, the system may determine merchants that are located near each other and may determine a shopping detour for visiting multiple nearby merchants.

In an embodiment, the system may analyze the user **105**'s schedule or calendar and may determine that the user **105** needs to be at the final destination at a particular time. If no other detours are available that allow the user **105** to arrive at the final destination at or before the particular time, the system may suggest that the user **105** stay on the original route, without taking a shopping detour. In an embodiment, the system may suggest a longer route to the final destination, because the longer route may allow the user **105** to arrive at the final destination faster due to better traffic conditions, higher speed limits, or less traffic lights on the longer route.

At step **312**, the system may receive user **105**'s response or selection of shopping detours from the list of options. The user **105** may decline all options of shopping detours and decide to stay on the original route with the traffic congestion. In this case, the system may continue to navigate the user **105** on the original route. In another scenario, the user **105** may review the list and may not see any desirable shopping detour options. In this case, the system may allow the user **105** to search for shopping detours to other merchants. For example, the user **105** may enter a product or service that the user **105** wishes to purchase. The system may search for merchants near the user **105** or near the original travel route that offer the product or service. The system may then determine shopping detours to these merchants and present them to the user **105** at step **314**. In a scenario, the user **105** may select one shopping detour option. At step **314**, the system may then present the directions for the selected shopping detour to the user **105** at user device **110**.

In an embodiment, the system may allow the user **105** to select two or more shopping detour options to form a combined shopping detour. For example, from a list of shopping detours to different merchants, the user **105** may select a first merchant and a second merchant. In response to the multiple selections, the system may automatically determine a new shopping detour including these two selected merchants. The shopping detour may provide directions to these two selected merchants. Further, the system may calculate a new estimated shopping time for this new detour including the total shopping time for the user **105** to visit and purchase items from these two merchants. A new travel cost and/or a new arrival time to the final destination for the new shopping detour to multiple merchants also may be calculated and presented to the user **105**.

In an embodiment, after the user **105** selects a shopping detour to one or more merchants, the system may allow the user **105** to pre-order products or make service appointment at the merchants, such that the user **105** may simply pick up the products or the merchants may be ready to render services to the user **105** when the user **105** arrives at the merchants. The shopping time may be reduced by pre-ordering products or services before the user **105** arrives at the merchants. In an embodiment, the system may automatically search and identify coupons or discounts related to the merchants or products selected by the user **105**. The system may allow the user **105** to select and save the coupons to be used for the user's visit to the merchants.

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By using the above processes **200** and **300**, potential purchase targets that the user intends to purchase or desires to purchase may be identified via purchase history, browsing history, to-do list, wish list, calendar, social networks, and the like. When the user is experiencing or is about to experience traffic congestion along a travel route, the system may automatically determine and suggest shopping detours to the user, based on the estimated delay of the traffic congestion. The system may allow the user to select a preferred shopping detour and may provide directions to navigate the user to the merchant. Thus, the system allows the user to take a shopping detour to avoid traffic congestion and still arrive at the final destination at about the same time as though the user stays on the original route.

The above processes **200** and **300** may be implemented at the user device **110**. In an embodiment, the above processes **200** and **300** may be implemented at the payment provider server **170** or the merchant device **140**. In still another embodiment, the above processes **200** and **300** may be implemented by the user device **110**, the payment provider server **170**, and/or the merchant device **140** in coordination with each other. Note that the various steps described herein may be performed in a different order, combined, and/or omitted as desired.

The following are exemplary scenarios in which the above processes **200** and **300** may be implemented.

EXAMPLE 1

A user uses a mobile device to provide travel navigation and direction. Based on the user's instructions, the mobile device maps a route from work to home for the user. However, based on information received from traffic information provider services, the mobile device determines that there is a traffic incident along the route that will cause delays in the drive time. As such, the mobile device may begin to determine different options of shopping detours for the user. Based on the user's to-do list, the user needs to purchase milk and eggs. Also, based on the user's social network and calendar, the user needs to purchase flowers for an anniversary. Further, based on the user's browsing history and wish list, the user wishes to purchase a hat. These potential purchase targets are inferred from various information about the user. The system may then search for merchants near the user, along an alternate route to the user's home, or near the route that offer the potential purchase target for sale.

A grocery store is found that offers milk and eggs for sale. A florist shop also is found that offers flowers for sale. A department store is found that offers various apparel and hats for sale. Further, based on the user's purchase history, the system also determines that the user's car is due for oil change. Thus, an auto-mechanic shop is found that offers oil change service. The system may determine detour routes to these respective merchants and travel time and cost and shopping or service time at these merchants. The travel time and travel cost for different detour options may be compared with the travel time and cost of the original route which includes the traffic congestion. For example, the travel delay for the original route is about 50 minutes. The shopping detour to the grocery store is 40 minutes, to the florist shop is 35 minutes, to the department store is an hour, and to the auto-mechanic shop is one hour and 10 minutes. The delays may be based on just a single stop to the specific merchant or be based on various combinations of the different merchants (such as grocery store and florist shop, grocery store, florist, and department store, etc.).

The information for different shopping detours may be presented to the user at the user's mobile device based on their shopping time. For example, shopping detours that have shopping times closest to the traffic time delay of the original route may be presented first (shopping detour to the grocery store and shopping detour to the florist shop). Detours provided first may also be ones that save the user the most overall time, factoring in the time the user would take to make a purchase if the user had to make a separate trip. The user may also be presented with the cost of gasoline for taking each shopping detour as compared with the cost of gasoline staying on the original route. Because the florist shop and the grocery store are located near each other, the user selects both the grocery store and the florist shop for shopping detour. The system automatically generates a new shopping detour for visiting both the grocery shop and the florist shop. The travel and shopping time of 50 minutes is estimated for the new shopping detour. The system also allows the user to browse and pre-order milk, eggs, and flowers from these merchants, which may be prepared and ready for the user's pick up. Thus, the user is presented with options for shopping detours to avoid the traffic congestion. The user is able to select shopping detours to pick up needed products and still arrives at home at about the same time as if the user stays on the original route with the traffic congestion.

FIG. 4 is a block diagram of a computer system 400 suitable for implementing one or more embodiments of the present disclosure. In various implementations, the user device may comprise a personal computing device (e.g., smart phone, a computing tablet, a personal computer, laptop, PDA, Bluetooth device, key FOB, badge, etc.) capable of communicating with the network. The merchant and/or payment provider may utilize a network computing device (e.g., a network server) capable of communicating with the network. It should be appreciated that each of the devices utilized by users, merchants, and payment providers may be implemented as computer system 400 in a manner as follows.

Computer system 400 includes a bus 402 or other communication mechanism for communicating information data, signals, and information between various components of computer system 400. Components include an input/output (I/O) component 404 that processes a user action, such as selecting keys from a keypad/keyboard, selecting one or more buttons or links, etc., and sends a corresponding signal to bus 402. I/O component 404 may also include an output component, such as a display 411 and a cursor control 413 (such as a keyboard, keypad, mouse, etc.). An optional audio input/output component 405 may also be included to allow a user to use voice for inputting information by converting audio signals. Audio I/O component 405 may allow the user to hear audio. A transceiver or network interface 406 transmits and receives signals between computer system 400 and other devices, such as another user device, a merchant server, or a payment provider server via network 160. In one embodiment, the transmission is wireless, although other transmission mediums and methods may also be suitable. A processor 412, which can be a micro-controller, digital signal processor (DSP), or other processing component, processes these various signals, such as for display on computer system 400 or transmission to other devices via a communication link 418. Processor 412 may also control transmission of information, such as cookies or IP addresses, to other devices.

Components of computer system 400 also include a system memory component 414 (e.g., RAM), a static storage component 416 (e.g., ROM), and/or a disk drive 417. Computer system 400 performs specific operations by processor 412 and other components by executing one or more sequences of instructions contained in system memory component 414. Logic may be encoded in a computer readable medium, which may refer to any medium that participates in providing instructions to processor 412 for execution. Such a medium may take many forms, including but not limited to, non-volatile media, volatile media, and transmission media. In various implementations, non-volatile media includes optical or magnetic disks, volatile media includes dynamic memory, such as system memory component 414, and transmission media includes coaxial cables, copper wire, and fiber optics, including wires that comprise bus 402. In one embodiment, the logic is encoded in non-transitory computer readable medium. In one example, transmission media may take the Rum of acoustic or light waves, such as those generated during radio wave, optical, and infrared data communications.

Some common forms of computer readable media includes, for example, floppy disk, flexible disk, hard disk, magnetic tape, any other magnetic medium, CD-ROM, any other optical medium, punch cards, paper tape, any other physical medium with patterns of holes, RAM, PROM, EEPROM, FLASH-EEPROM, any other memory chip or cartridge, or any other medium from which a computer is adapted to read.

In various embodiments of the present disclosure, execution of instruction sequences to practice the present disclosure may be performed by computer system 400. In various other embodiments of the present disclosure, a plurality of computer systems 400 coupled by communication link 418 to the network (e.g., such as a LAN, WLAN, PTSN, and/or various other wired or wireless networks, including telecommunications, mobile, and cellular phone networks) may perform instruction sequences to practice the present disclosure in coordination with one another.

Where applicable, various embodiments provided by the present disclosure may be implemented using hardware, software, or combinations of hardware and software. Also, where applicable, the various hardware components and/or software components set forth herein may be combined into composite components comprising software, hardware, and/or both without departing from the spirit of the present disclosure. Where applicable, the various hardware components and/or software components set forth herein may be separated into sub-components comprising software, hardware, or both without departing from the scope of the present disclosure. In addition, where applicable, it is contemplated that software components may be implemented as hardware components and vice-versa.

Software, in accordance with the present disclosure, such as program code and/or data, may be stored on one or more computer readable mediums. It is also contemplated that software identified herein may be implemented using one or more general purpose or specific purpose computers and/or computer systems, networked and/or otherwise. Where applicable, the ordering of various steps described herein may be changed, combined into composite steps, and/or separated into sub-steps to provide features described herein.

The foregoing disclosure is not intended to limit the present disclosure to the precise forms or particular fields of use disclosed. As such, it is contemplated that various alternate embodiments and/or modifications to the present disclosure, whether explicitly described or implied herein, are possible in light of the disclosure. Having thus described embodiments of the present disclosure, persons of ordinary skill in the art will recognize that changes may be made in form and detail without departing from the scope of the present disclosure. Thus, the present disclosure is limited only by the claims.

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What is claimed is:

1. A system comprising:

a non-transitory memory storing information about an account of a user; and

one or more hardware processors coupled to the non-transitory memory and configured to read instructions from the non-transitory memory to cause the system to perform operations comprising:

determining a first travel route for a user and calculating a first travel time to a first location;

detecting at least one travel delay along the first travel route and calculating a second travel time for the first travel route to the first location based on the at least one travel delay;

determining at least one shopping detour to a merchant;

calculating a third travel time for a second travel route to the at least one shopping detour and the first location; and

presenting the second travel route that includes the at least one shopping detour to the user when the third travel time is less than the second travel time.

2. The system of claim 1, wherein the one or more hardware processors are further configured to read instructions from the non-transitory memory to cause the system to perform operations comprising:

inferring a purchase target based on one or more of purchase history of the user, browsing history of the user, a to-do list of the user, a wish list of the user, a social network account of the user, and a calendar of the user;

searching for the merchant who offers the purchase target and located near a current location of the user or the first travel route of the user; and

mapping a shopping detour route from the current location of the user to the merchant.

3. The system of claim 1, wherein the one or more hardware processors are further configured to read instructions from the non-transitory memory to cause the system to perform operations comprising:

estimating a delay time caused by the travel delay;

estimating a shopping detour time for traveling to and shopping at the merchant; and

presenting the delay time and the shopping detour time to the user for comparison.

4. The system of claim 3, wherein the delay time caused by the travel delay is estimated based on one or more of a speed of traffic flow through the traffic delay, a type of traffic delay, a duration of the traffic delay, a distance between the user and the traffic delay, and a distance stretch of the traffic delay.

5. The system of claim 3, wherein the shopping detour time is estimated based on one or more of a travel distance to the merchant, a traffic flow speed along the shopping detour to the merchant, a wait time at the merchant, and a parking availability at the merchant.

6. The system of claim 1, wherein the one or more hardware processors are further configured to read instructions from the non-transitory memory to cause the system to perform operations comprising:

presenting the second travel time and the third travel time to the user for comparison.

7. The system of claim 1, wherein the one or more hardware processors are further configured to read instructions from the non-transitory memory to cause the system to perform operations comprising:

determining a desired arrival time at a final destination based on a calendar of the user;

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selecting the first travel route or the second travel route that allows the user to arrive at the final destination on or before the desired arrival time; and

presenting the first travel route or the second travel route to the user.

8. The system of claim 1, wherein the one or more hardware processors are further configured to read instructions from the non-transitory memory to cause the system to perform operations:

estimating a first travel cost for taking the first travel route to a final destination;

estimating a second travel cost for taking the second travel route to the final destination; and

presenting the first and the second travel costs to the user for comparison.

9. The system of claim 8, wherein the first and the second travel cost each include one or more of a fuel cost, an estimated cost of wear to a vehicle of the user, a toll charge, a carbon emission, and a cost of electricity.

10. The system of claim 1, wherein the one or more hardware processors are further configured to read instructions from the non-transitory memory to cause the system to perform operations comprising:

providing an user interface for the user to pre-order a product or a service from the merchant while the user is in-route to the merchant;

receiving a purchase order from the user; and

sending the purchase order to the merchant.

11. A method comprising:

determining a travel route for a user and calculating a first travel time to a first location;

detecting, by a hardware processor, at least one travel delay along the first travel route and calculating a second travel time for the first travel route to the first location based on the at least one travel delay;

determining, by the hardware processor, a plurality of shopping detours to respective merchants;

calculating a third travel time for a second travel route to least one shopping detour from the plurality of shopping detours and to the first location; and

presenting, by the hardware processor, the second travel route to the user when the third travel time is less than the second travel time.

12. The method of claim 11 further comprising:

determining a probability score for each of the shopping detours indicating a likelihood that the user intends to or desires to take the shopping detour to visit a merchant; and

presenting one or more of the plurality of shopping detours to the user based on probability scores of the shopping detours.

13. The method of claim 12, wherein the probability score is calculated based on one or more of a number of sources from which the shopping detour is inferred from and a type or types of sources from which the shopping detour is inferred from.

14. The method of claim 11 wherein,

the third travel time includes traveling to and shopping at least one of the respective merchants.

15. The method of claim 14, further comprising:

presenting the plurality of shopping detours to the user based on how closely matching the shopping detour time of each of the shopping detours is to the delay time caused by the travel delay.

16. The method of claim 11, further comprising:

determining a travel cost for each of the plurality of shopping detours; and

presenting the plurality of shopping detours to the user based on the travel cost of each of the plurality of shopping detours.

17. The method of claim 11, further comprising:

receiving a selection from the user selecting two or more shopping detours;

generating a new shopping detour combining the selected two or more shopping detours; and

presenting directions for the new shopping detour to the user.

18. A non-transitory machine-readable medium having stored thereon machine-readable instructions executable to cause a machine to perform operations comprising:

determining a first travel route for a user and calculating a first travel time to a first location;

detecting at least one travel delay along the first travel route and calculating a second travel time for the travel route to the first location based on the at least one travel delay;

determining a plurality of shopping detours to respective merchants;

calculating a third travel time for a second travel route to at least one shopping detour from the plurality of shopping detours and to the first location; and

presenting the second travel route to the user when the third travel time is less than the second travel time r.

19. The non-transitory machine-readable medium of claim 18, wherein the operations further comprise:

selecting a shopping detour that has approximately a same arrival time as that of the first travel route; and

presenting the selected shopping detour to the user.

20. The non-transitory machine-readable medium of claim 19, wherein the operations further comprise:

selecting a shopping detour to two or more merchants when a travel time to the two or more merchants and to the first location is less than the second travel time; and

presenting the selected shopping detour to the user.

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